Current Ground Campaign

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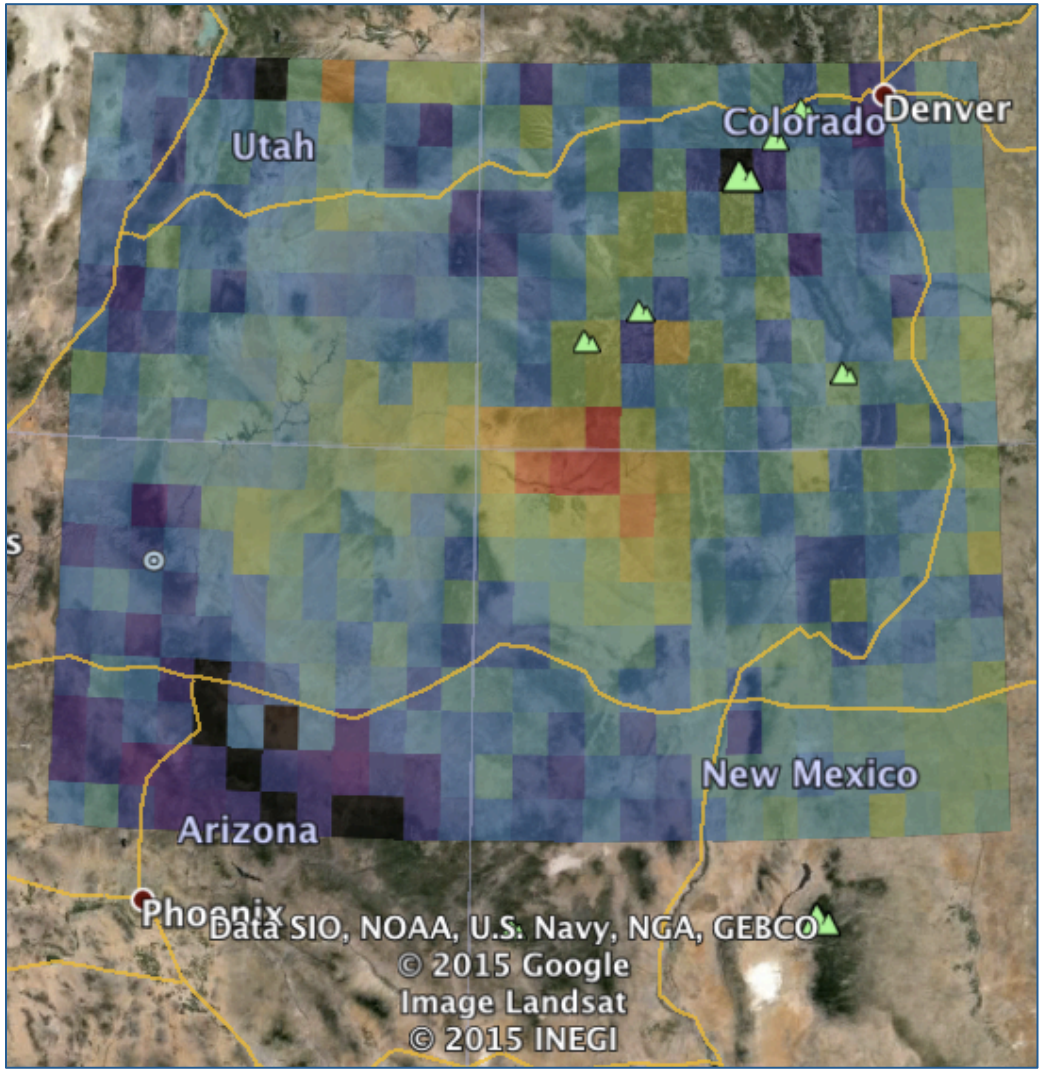
Persistent high methane in 4 corners



Why it is important to study?

1. Methane is a strong greenhouse gas that contributes to climate change

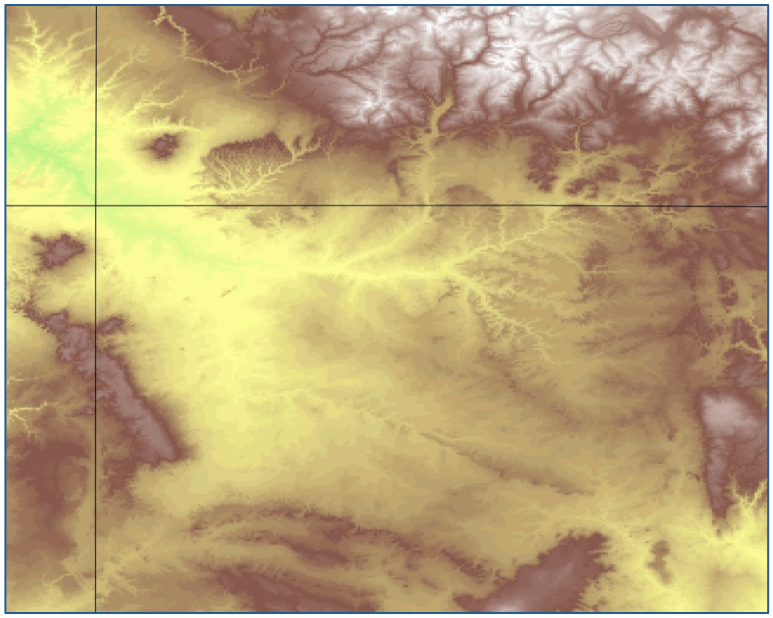
2. Other gases may be emitted together with methane and they may impact air quality (ozone precursors) or be hazardous (H_2S,…)

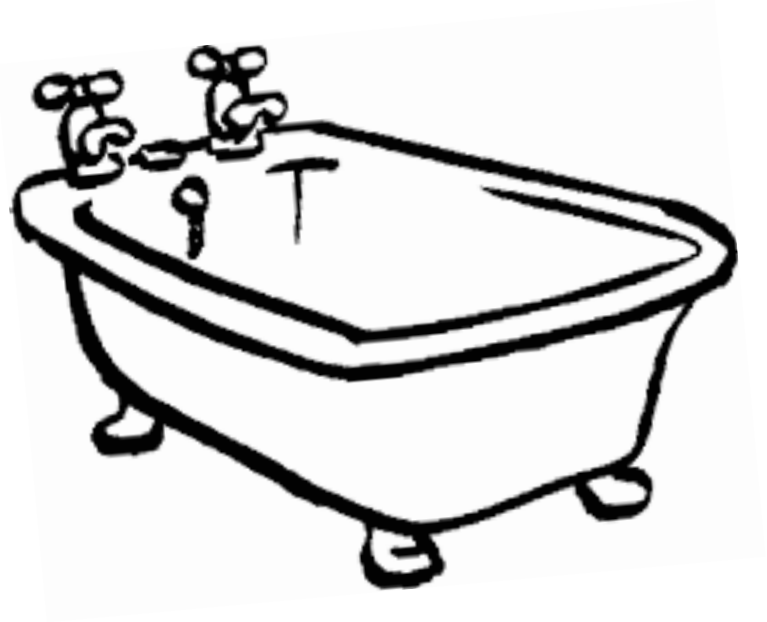
Taking the next steps: Questions

- Was/Is methane <u>really</u> that high?
- <u>Where</u> is methane coming from?
- <u>Why</u> here?
- <u>What else</u> is in the air?

What causes pollution hotspots?

- Upwind or local sources
- Topography
- Weather patterns: inversions, recirculation





How do we study this hotspot?

Sources Puzzle

Topography

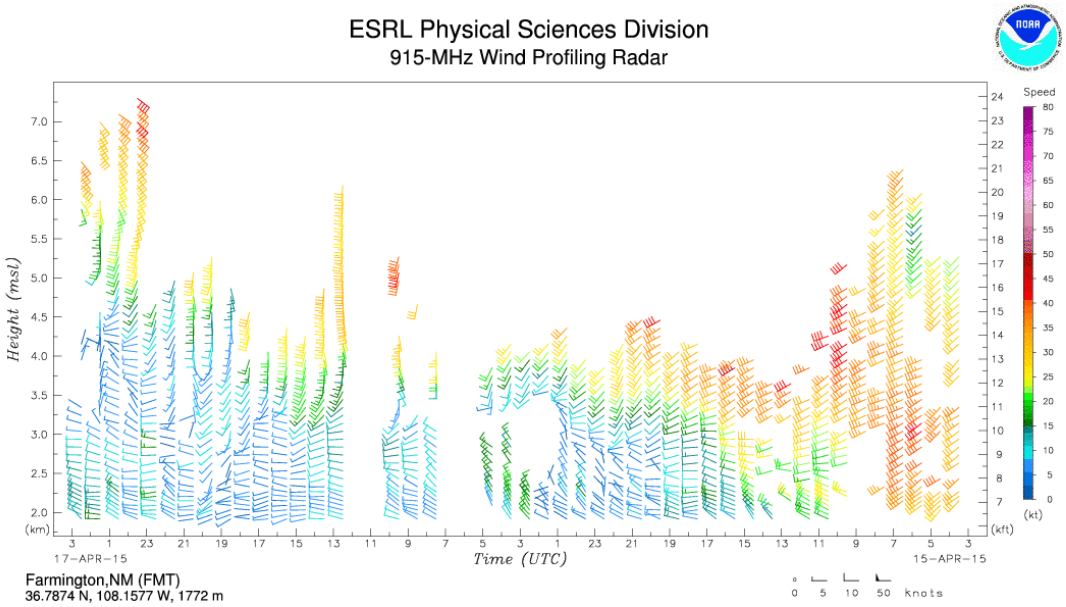
It is what it is

Meteorology

Track Meteorology (winds)

- ✓24/7
- ✓From surface to 18,000 ft above ground level
- ✓In 3 locations

Physical Sciences Division



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UNITED STATES DEPARTMENT OF COMMERCE

What could release methane in the area?

- Landfills?
- Wetlands?
- Fires?
- Cows?
- Rice cultivation?
- Natural gas operations?
- Coal Mining?
- Gas escaping from coal bed outcrop (seepage)?
- Urban areas?

What could release methane in the area?

- Landfills?
- ~~Wetlands~~?
- ~~Fires~~? (not persistently)
- Cows?
- ~~Rice cultivation?~~
- Natural gas operations?
- Coal Mining?
- Gas escaping from coal bed outcrop (seepage)?
- Urban areas?

Zooming in on methane levels

Satellite

Instrumented Aircraft

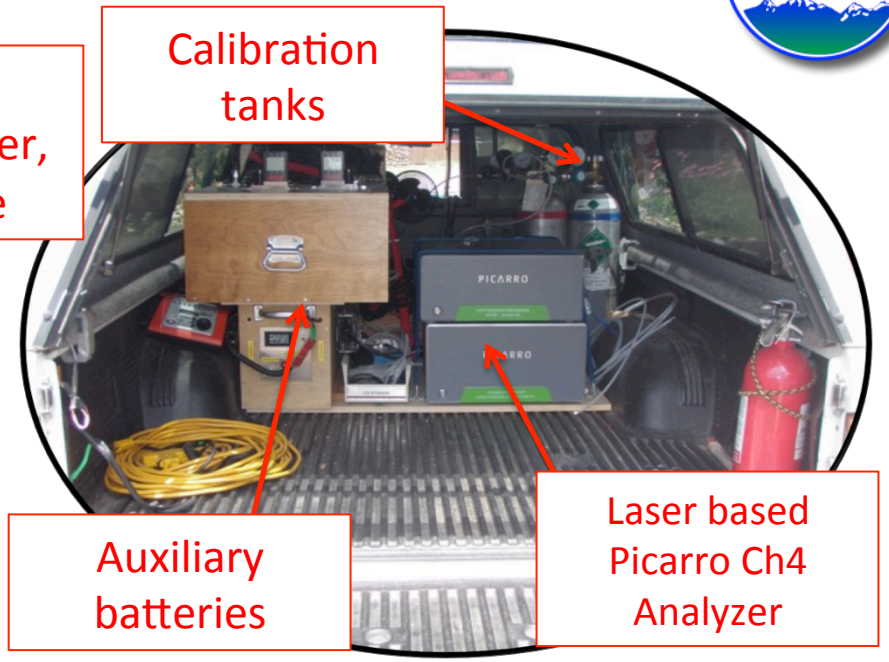
Mobile Laboratories

Ground teams

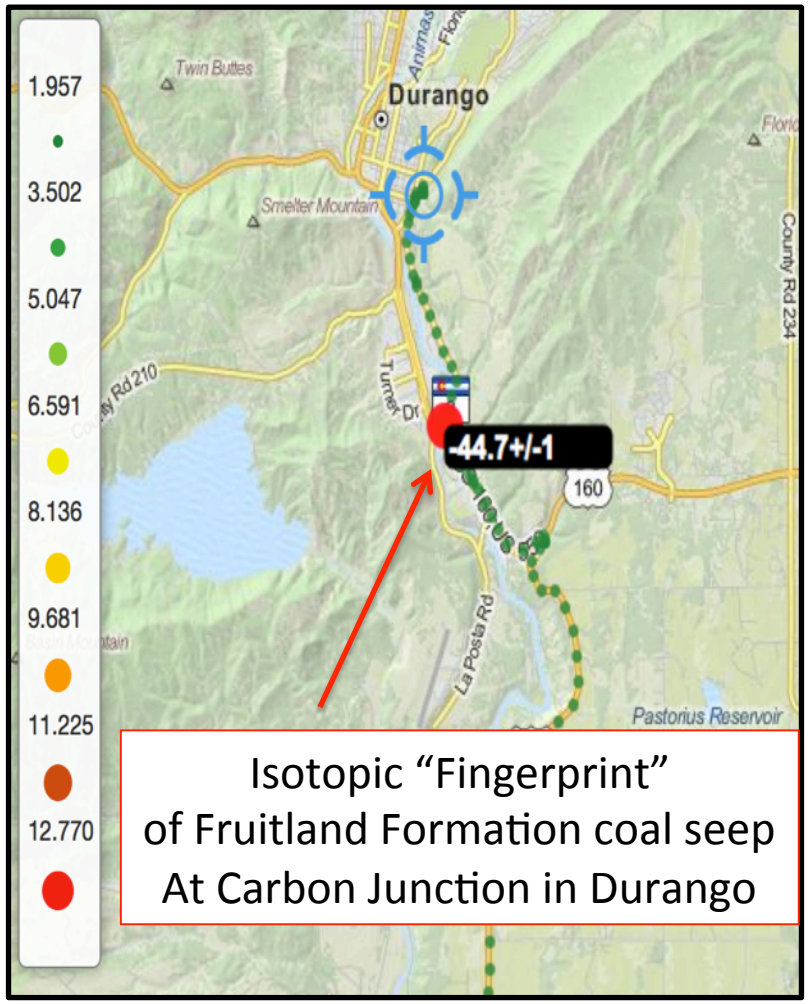
- Survey region with instrumented vehicles to:
  - Locate & identify sources of methane
  - Sample methane plumes (chemical fingerprint)

- Investigate signals captured by aircraft

The INSTAAR Mobile Methane Lab



Isotopes are like fingerprints that tell us where the methane comes from



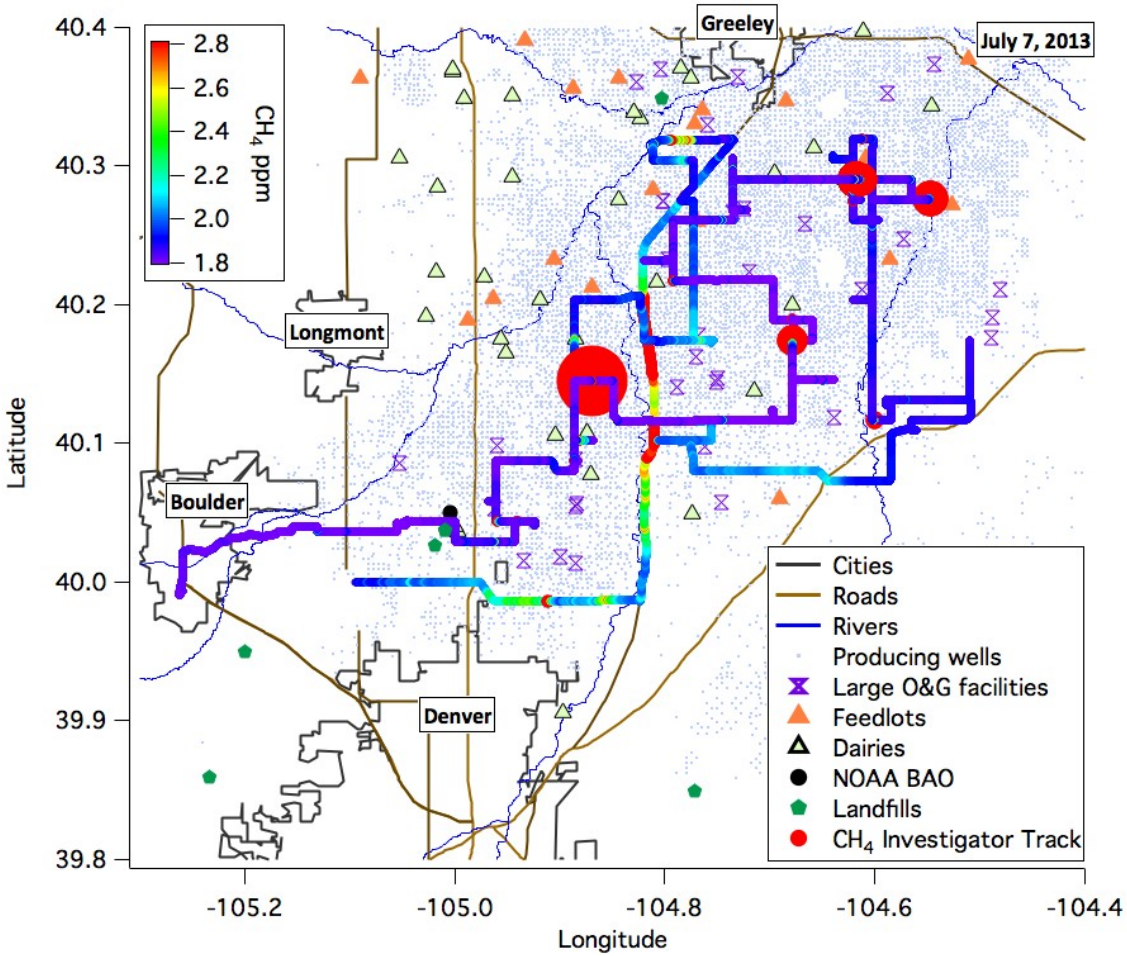
Isotopic "Fingerprint"
of Fruitland Formation coal seep
At Carbon Junction in Durango

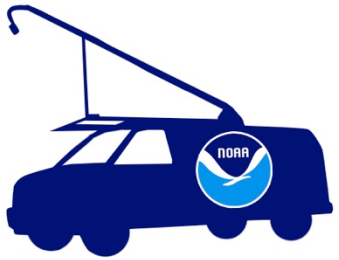
The NOAA Mobile Lab

- GPS, winds, temperature, RH
- In-situ methane, CO_2, CO, water vapor, ozone
- Discrete air samples in flasks analyzed in NOAA and INSTAAR labs

Example of survey data in NE Colorado

Road track color-coded by measured methane
(day and nighttime data)

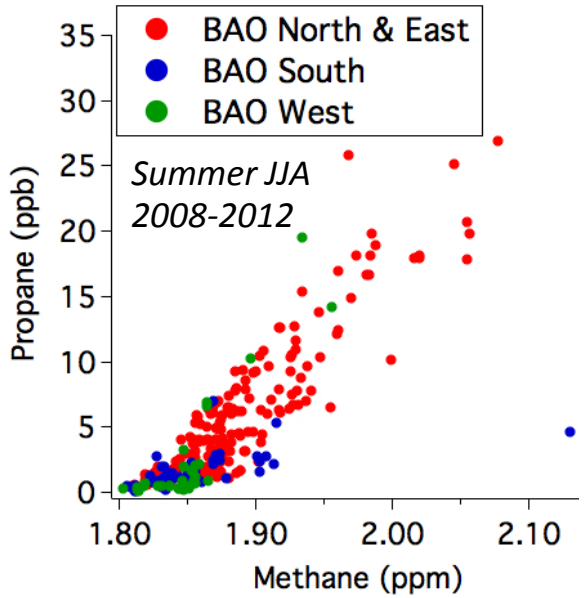


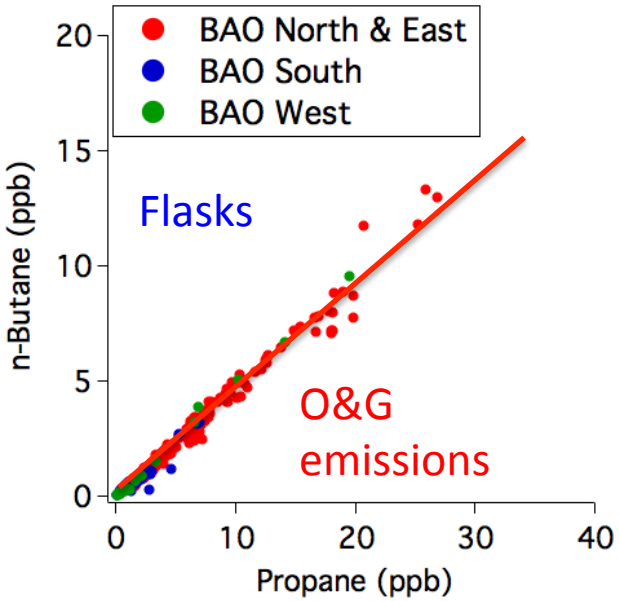


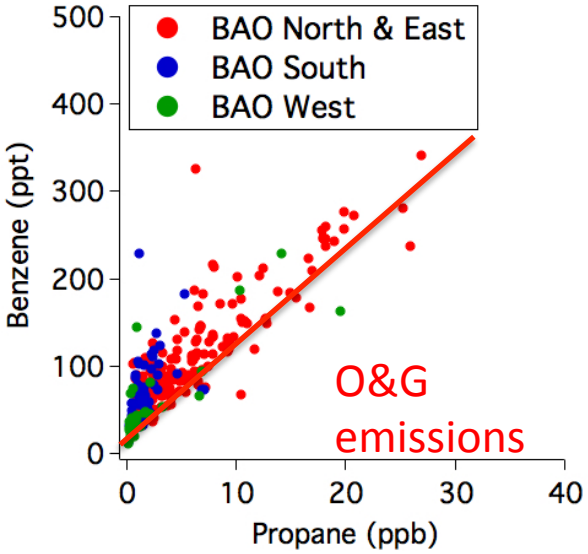
Red color indicates higher methane levels.

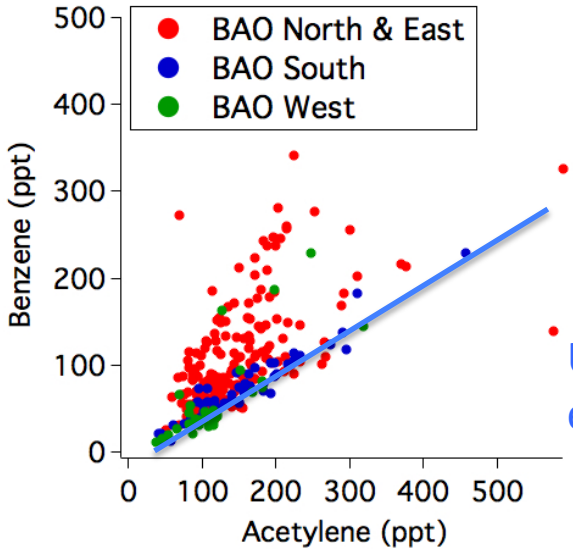
Dark blue color indicate levels close to background for that latitude and time of year.

NE Colorado Tower: Ex. of Multiple species analysis









The site sees urban emissions when air comes from the South and the influence of emissions from oil and gas operations when air comes from the NE.


Thank you
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